LEPEL

TECHNICAL MANUAL

MP MASTER
MA29121

INSTRUCTION MANUAL

for

INDUCTION HEATING GENERATOR

T-1-1-KC1-B1A(T)

LepeL High Frequency Laboratories, Inc.
59-21 Queens-Midtown Expressway
Maspeth, New York City, N.Y. 11378

SAFETY FIRST

DANGER: HAZARDOUS VOLTAGES ARE PRESENT INSIDE THE CABINET.

PANEL INTERLOCKS DO NOT REMOVE ALL THE VOLTAGE FROM WITHIN THE CABINET.

OPEN THE MAIN DISCONNECT BEFORE SERVICING THE EQUIPMENT.

WARNING: If the interlocks are disabled, and the main circuit breaker is on with a panel open, lethal voltages may be exposed.

Equipment should be serviced by qualified personnel only.

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* Applicable Drawing Enclosed

SECTION 1

1. DESCRIPTION

1.1 GENERAL

The T-1-1-KC1-B1A (T) Lepel induction heating generator is designed to deliver to an appropriate inductively coupled load 1 KW of high frequency energy in the range of 250KHz to 800 KHz.

The generator is certified to conform to the Federal Communications Commission Rules and Regulations, Part 18, Subpart 'D' (Industrial Heating Equipment).

1.2 ELECTRICAL

The electrical system consists of three elements:

1.2.1 Control System

The control system includes the pushbuttons, meters, pilot lights, safety interlocks, relays and contactor.

1.2.2 DC Supply

The high voltage D C power supply converts line voltage through a high voltage transformer and rectifiers to high voltage direct current.

1.2.3 Oscillator

The self-excited vacuum tube oscillator converts direct current to radio frequency power.

A tapped tank coil and variable grid coil provide the flexibility required to match a wide range of workpieces and load coils to the generator output.

1.3 SPECIFICATIONS

RF Power Output	1 KW
RF Output Frequency Range	250 KHz to 800 KHz (See Note 2)
Power Input (Single Phase)	2.4 KVA
Input Line Voltage (Single Phase)	115 Volts
Full Load Current	21 AMPS
Power Factor (Full Load)	90%
Cooling Water Supply	
Flow	.25 GPM
Pressure (at inlet)	40 PSI to 65 PSI
Temperature (at inlet)	80° F
Electron Tubes	
Oscillator	Lepel Stk. No. 018-0033
Filament Voltage	10.0 VAC ± 0.5 VAC
Filament Current	10 AMPS
DC Plate Voltage	3.2 KV
DC Plate Current	475 MA (maximum)
DC Grid Current	50 MA to 100 MA
Rectifiers	
Solid State	Lepel Stk. No. 016-0034
Time delay relay setting (for warm up of the oscillator tube filament)	15 seconds
Cabinet	31 1/2" wide x 19 1/2" deep x 24" high (280 lbs.)

NOTES:

1. Refer to the graph for grid current limits at reduced plate current values.

2. Operation from 490 KHz to 510 KHz is prohibited by the Federal Communications Commission.

1.4 MODE OF OPERATION

Two modes of operation are provided, manual and automatic, the selection of which is made through the setting of the 'Manual/Automatic' toggle switch located on the generator front panel. In the 'Manual' position the 'Power Control' potentiometer on the front panel controls generator output. In the 'Automatic' position, a DC current from a remove device such as a temperature sensor automatically controls generator power output.

1.5 SCR POWER CONTROLLER

The SCR power controller module utilizes two SCR's to vary the generator RF output power.

The controller applies phase-shifted gate signals to the SCR's which control the AC power to the input of the plate transformer and consequently the RF output power of the generator.

The controller incorporates a 'Fast Gate Shutdown Circuit' to turn off the SCR's rapidly in the event of an AC current overload. Such an overload will energize a control relay causing both the time delay relay and the plate contactor to become deenergized, thus removing all power from the controller, the plate transformer and the RF section of the generator. Power can be reactivated through the 'Plate Start' pushbutton after the cause of the overload has been removed and the required time delay has elapsed.

1.5.1 Adjustments

The controller includes three potentiometers marked 'OVLD', 'BIAS' and 'GAIN' which become accessible when the top panel of the generator is removed.

The 'OVLD' (Fast Gate Shutdown" adjustment is factory-set at the extreme counterclockwise position and should not be readjusted.

The 'BIAS' and 'GAIN' adjustments are used only when the generator is operated in the 'Automatic' mode.

The 'BIAS' adjustment sets the minimum control signal level

1.5.1 (Cont'd)

that corresponds to a zero generator RF output.

The 'GAIN' adjustment sets the control signal level required to achieve a maximum generator RF output.

WARNING: Lethal voltages will be exposed if a panel interlock is bypassed and the panel removed while plate power is on.

CAUTION: Since it will be necessary to start up the generator in order to complete the following adjustments, it is essential that the entire manual be understood before proceeding. Before making either adjustment and prior to removing the top panel, deactivate plate power by pressing the 'Plate Stop' pushbutton.

NOTE: In order to take plate current readings, it is necessary to install the top panel before plate power can be activated.

1.5.1.1 Bias Adjustment

Set the control signal level to 1 MA, deactivate plate power and turn the 'BIAS' adjusting screw clockwise in small increments to increase plate current or counter clockwise to decrease it. Reactivate plate power and check the plate current reading. Repeat until the plate current reading is zero.

1.5.1.2 Gain Adjustment

Set the control signal level to 5 MA, deactivate plate power and turn the 'GAIN' adjusting screw clockwise in small increments, to increase plate current or counterclockwise to decrease it, reactivate plate power and check the plate current reading. Repeat until the plate current reading is maximum.

NOTE: 1. Maximum plate current occurs at that point where concontinued rotation of the 'Gain' adjusting screw no longer results in an increasing plate current. i.e. plate current ceases to increase when the full line current is being applied to the primary of the plate transformer.

1.5.1.2 (Cont'd)

2. Since there is some interaction between the 'Bias' and 'Gain' adjustments, it may be necessary to repeat the above procedure several times until both the 'Bias' and 'Gain' operating points are simultaneously stabilized.

3. Use a small insulated screwdriver for making these adjustments.

4. If the SCR controller becomes inoperative it may be temporarily disconnected from the circuit by reconnecting the input power cables to the controller as indicated below:
   A. Remove the three cables from controller terminals L1, L2X2 and X1.
   B. Connect cables previously tied to L1 and X1 together and insulate the connection.
   C. Insulate the loose end of the cable previously tied to L2X2.

Under these conditions the front panel power control adjustment is inoperative and only tank coil tap adjustments can be employed to vary the generator RF output power.

SECTION 2

2. UNPACKING AND INSPECTION

Inspect the shipment for any sign of damage before uncrating.

Cut the metal strapping from the carton, remove all the nails from around the skid base and raise the carton straight up, intact.

The oscillator tube is packed separately, using special materials for absorbing transient shocks. Nevertheless, rough handling can cause internal defects which must be checked for immediately upon delivery. An ohmmeter is adequate for making preliminary tests. The circuit between the filament terminals should be of a very low resistance, conversely, the circuit between filament and grid, filament and anode, and grid and anode should have a resistance in excess of several megohms.

Also packed separately is the footswitch assembly (Stk. No. 043-0008) and the optional water solenoid (Stk. No. 040-0001).

These components should also be inspected for damage before installing the generator.

If these inspections reveal any damage or if the resistance readings of the oscillator tube proves faulty, report the facts to the carrier immediately and advise your Lepel representative.

All components were tested prior to shipment and the carrier is responsible for any damage caused in transit including 'concealed damage'.

Remove the panels and taking care not to cut or displace the grid drive pulley cord remove all blocking and packing material used to eliminate vibration and abrasion in transit.

SECTION 3

3. INSTALLATION

WARNING: The main power supply must remain 'Off' until the entire installation is completed.

3.1 ELECTRICAL

3.1.1 Power Line

Provide a 3 wire, single phase electrical service equipped with a fused disconnect switch adequate to supply the generator power requirements. (See 'Specifications' and 'Generator Installation Specifications', Drawing No. 9570041).

Satisfactory performance of the equipment is dependent on the use of a constant voltage power supply. Variations in line voltage will shorten the life of the oscillator tube and cause unstable operation.

3.1.2 Grounding

A ground connection is provided on the rear base of the generator and should be connected by a #10 wire or preferably a copper strip, about 1/16 x 2" to a good ground such as a water pipe that runs directly into the earth near the generator. A satisfactory substitute for a waterpipe is a single piece of clean copper or brass rod of at least 1/2" diameter that has been driven vertically into the earth close to the generator, to a depth of at least 8 feet. (Refer to National Electrical Code, 'Made Electrodes'.) A second ground terminal is provided near the circuit breaker for grounding the third wire of the 3 wire, single phase electrical service.

A low impedance connection (e.g. a copper strap 1" wide x 1/32" thick)should also be provided between this terminal and any metallic jigs or fixtures which may be used in conjunction with the work coil. This connection is required in order to eliminate voltages generated in the fixture by the coupling existing between the fixtures and the load coil.

3.1.3 Oscillator Tube

Inspect the oscillator tube socket and remove any foreign matter that might prevent the proper seating of the tube. Carefully remove the oscillator tube from its carton, insert it in the tube socket and install the plate connector on the top terminal post. All tube connectors must be tight fitting.

3.2 WATER SUPPLY

The cooling water supply should be capable of delivering 1 GPM at a pressure of 40 PSI to 65 PSI. Fluctuations in the water flow may result in the interruption of generator operation.

A shut-off valve must be used to service fixtures and other accessories that require water cooling.

Connect a water strainer to the generator water inlet.

3.3 WATER DRAIN

To insure proper drainage the water outlet should lead to an open (gravity) drain capable of handling a greater quantity of water than that specified for the generator cooling requirements. It should be located close enough to the generator to allow the operator to visually monitor the water flow. When the use of an overhead drain is unavoidable install a check valve in the drain line near the generator to prevent the reverse flow of water; never use a manually operated valve.

NOTE: Lepel High Frequency Laboratories, Inc. has a staff of field engineers who are available to install or to supervise the installation of Lepel induction heating equipment.

If Lepel installation service is required, we suggest that the 'Pre-Installation Check List' be completed prior to contacting your nearest Lepel district sales and service office to make an appointment.

SECTION 4

4. SAFETY

WARNING: If for any reason, the panel interlock switches are bypassed and the generator is operated with any panel removed, alternating and direct voltages in excess of 3000 volts will be exposed. These voltages may be fatal upon contact.

NOTE: It is essential that service and operating personnel be aware of the high voltages present within the generator enclosure and carefully observe the following precautions.

Since residual charges may remain in capacitors for some time after the generator is shut down all capacitors of large physical size and/or high voltage rating should be discharged before servicing.

When in operation, all panels must be securely fastened. When any panel is removed, the panel interlock switch automatically deactivates all high voltage circuits. However, the hazards normally accompanying the servicing of line voltage control circuits are still present and only qualified personnel should be permitted to work on such circuits.

Since high frequency voltages can produce arcs which may cause RF burns, operators must be instructed not to touch the load coil or load coil leads when the RF power is on. Appropriate guards must be provided to preclude the possibility of such contact. Since the workpiece may be very hot, both during and for some time after heating, the usual caution associated with such objects should be carefully observed.

SECTION 5

5. GENERATOR SET-UP

5.1 PRELIMINARY

A. Connect the load coil to the generator RF output terminals (do not apply any pipe sealant).

B. Slowly turn on the water supply and check for leaks.

C. With the disconnect switch and circuit breaker in the 'Off' position measure the line voltage at the input of the disconnect switch and if required, set the filament and plate transformer taps to the value closest to that of the measured voltage.

D. Apply power to the circuit breaker, CB1, by setting the disconnect switch to 'On'.

E. Apply power to the generator by setting the circuit breaker, CB1 to 'On' (this will energize the control and filament circuit.) There should be a flow of water exiting into the drain.

5.2 STARTING-UP

WARNING: Access panels are equipped with safety interlock switches which automatically deactivate all high voltage circuits. Therefore, remove at least one panel during steps A & B so that the plate power cannot be accidentally activated.

WARNING: Always set the 'Circuit Breaker' to 'Off' before relocating the tank coil link.

A. A glow in the oscillator tube indicates that filament current is on. After four or five minutes check the voltage at the filament terminals of the oscillator tube. If it departs from the value given in the 'Specifications' set the disconnect switch and circuit breaker to 'Off' and then relocate the filament transformer tap as required.

B. Set the tank coil link, tentatively, to tap No. 1, insert a workpiece into the load coil and install all panels.

5.2 (Cont'd)

C. Set the disconnect switch and then the circuit breaker to 'On'.

D. Set the 'Pulsing/Manual' toggle switch to 'Pulsing'.

E. Plug the footswitch into receptacle, J1.

F. Set the 'Manual/Auto' toggle switch to 'Manual'.

For Optional Timer Operation

E. Plug the timer power cable into receptacle J2 and the normally open contacts into receptacle J1. (The timer is activated through a footswitch plugged into the receptacle on the timer cabinet).

For Pushbutton Operation

D. Set the 'Pulsing/Manual' toggle switch to 'Manual'.

E. Use the 'Start' and 'Stop' pushbuttons to cycle the generator.

5.3 FINAL ADJUSTMENTS

A. Set the 'Power' control to zero.

B. Set the 'Grid' control to '50'.

C. Press 'Start' pushbutton.

D. After the required 15 second time delay has elapsed depress footswitch momentarily; plate and grid meters should read very low. (The readings vary with the size of the load coil and the mass and resistivity of the workpiece).

E. Depress the footswitch.

F. Slowly advance the 'Power' control to maximum where the grid meter should read between 50 MA and 100 MA and, since the tank coil link is set to tap no. 1, the plate meter may read less than 475 MA.

G. To increase plate current, relocate the tank coil link to progressively higher numbered taps until the plate meter reads near 475 at the maximum setting of the 'Power' control. At the same time, adjust the grid control to establish grid current within its specified limits of 50 MA to 100 MA. (Refer to the graph for grid current limits at reduced plate current values.)

5.3 (Cont'd)

The 'Power' control can now be set from practically zero to maximum and plate current will track with grid current.

THE GENERATOR IS NOW ADJUSTED FOR MAXIMUM POWER OUTPUT

NOTE: For automatic operation set the 'Manual/Auto' toggle switch to 'Auto' and with a 0-5 MA signal from a remote device controlling generator power output, the generator can be cycled either from the pushbuttons or the footswitch.

5.4 PRACTICAL OPERATING CONSIDERATIONS

In some applications, optimum loading and maximum generator output may be neither practical nor desirable; for example:

A. If optimum loading has been achieved through the selection of tank coil taps the heating rate may be decreased either by setting the 'Power Control' to a lower number or by relocating the tank coil link to a lower numbered tap. The latter approach is preferable to that of using a very low 'Power Control' setting.

B. If a load coil/workpiece combination is used where a satisfactory heating rate is obtained with plate current at less than its maximum permissible value, no further adjustments are necessary.

The following adjustments cause grid and plate currents to vary as shown, while opposite adjustments will reverse the grid and plate current responses.

Adjustment	Grid Current	Plate Current
(a) Set the 'Grid Control' to a higher number.	Increase	Increase (Slightly)
(b) Move the tank coil slider to a higher numbered tap.	Decrease	Increase
(c) Increase the number of load coil turns.	Decrease	Increase
(d) Decrease the load coil to workpiece clearance.	Decrease	Increase
(e) Increase the workpiece resistivity.	Decrease	Increase

5.4.1 Plate Current

The maximum permissible plate current is fixed by the tube manufacturer and should not be exceeded; see specifications.

If plate current reaches its maximum permissible value before the 'Power' control reaches maximum, decrease plate current by relocating the tank coil link to a lower numbered tap.

If the maximum permissible plate current is exceeded, the plate overload relay will deactivate plate power and the tank coil link should likewise be relocated to a lower numbered tap.

The relay will automatically restore itself and plate power can be applied after a 15 second delay.

5.4.2 Grid Current

The maximum permissible grid current is fixed by the tube manufacturer and must be carefully observed; see 'Specifications'.

CAUTION: If grid current is at zero or is drifting down toward zero while plate current is rising, immediately shut off plate power. This is an indication that oscillation is stopping and plate current without oscillation can result in tube damage due to overheating. Increase grid current by setting the 'Grid' control to a higher number before restarting the generator.

Never operate the generator with grid current at less than its minimum permissible value (see graph).

If grid current reaches its maximum permissible value before the 'Power' control reaches maximum (or exceeds this valve at the maximum 'Power' control setting) adjust the 'Grid' control to bring grid current back into its permissible limits.

If insufficient grid current cannot be obtained through the use of 'Grid' control adjustment, increase the clearance between the load coil and workpiece and/or reduce the number of load coil turns.

CAUTION: An oscillator tube damaged due to overdriving or underdriving the grid is not covered by the manufacturers warranty.

5.4.3 General Considerations

When heating ferrous materials, plate and grid currents will vary throughout the heating cycle. Plate current should reach its maximum permissible value while grid current should vary within its specified limits. After heating the ferrous workpiece to about 1400^{o} F (Curie point), plate current will drop and grid current will rise (this plate and grid current swing does not occur when heating non-ferrous materials.)

It may be necessary when setting up the generator to heat a ferrous workpiece, to relocate the tank coil link and to readjust the 'Power' and 'Grid' controls several times in order to achieve the proper heating rate.

Whenever either the load coil or workpiece is changed, some readjustment of the controls will be necessary.

Once the desired settings have been established, record them for subsequent use.

5.5 SHUTTING DOWN THE GENERATOR

1. Press 'Stop' pushbutton
2. Set the circuit breaker to 'Off'.
3. After a delay of at least one minute turn off the water supply.
4. Set the disconnect switch to 'Off'.

THE SHUTDOWN IS COMPLETE

SECTION 6

6. GENERAL CARE AND MAINTENANCE

As with all industrial equipment the ideal schedule for periodic maintenance is a function of both usage and environment. An initial inspection three months after installation with inspections every six months thereafter is suggested.

a) Clean the high voltage insulation, which includes ceramic insulators, rubber hoses, the glass envelope of the oscillator tube, etc. (This is especially important in the presence of corrosive or contaminating vapors.)

b) Clean the water strainer screen and check for breaks.

SECTION 7

7. SPARE PARTS LIST

For uninterrupted production it is suggested that the following replacement parts be stocked:

Quantity	Description	Reference Designation	Lepel Stk. No.
1	Oscillator Tube (see note 1)	V1	018-0033
1	Grid Bypass or Plate Blocking Capacitor	C8 or C5	007-0104
1	Grid Resistor	R9	038-0014
1	Plate By-Pass Capacitor	C4	007-0104
2	Rectifier	CR1 to CR2	016-0034
1	Time Delay Relay	K3	037-0035

NOTE: The replacement oscillator tube should be rotated with the one in the generator every 6 months so that a field-tested tube will always be ready for emergency use.

SECTION 8

8. SPARE PARTS LIST

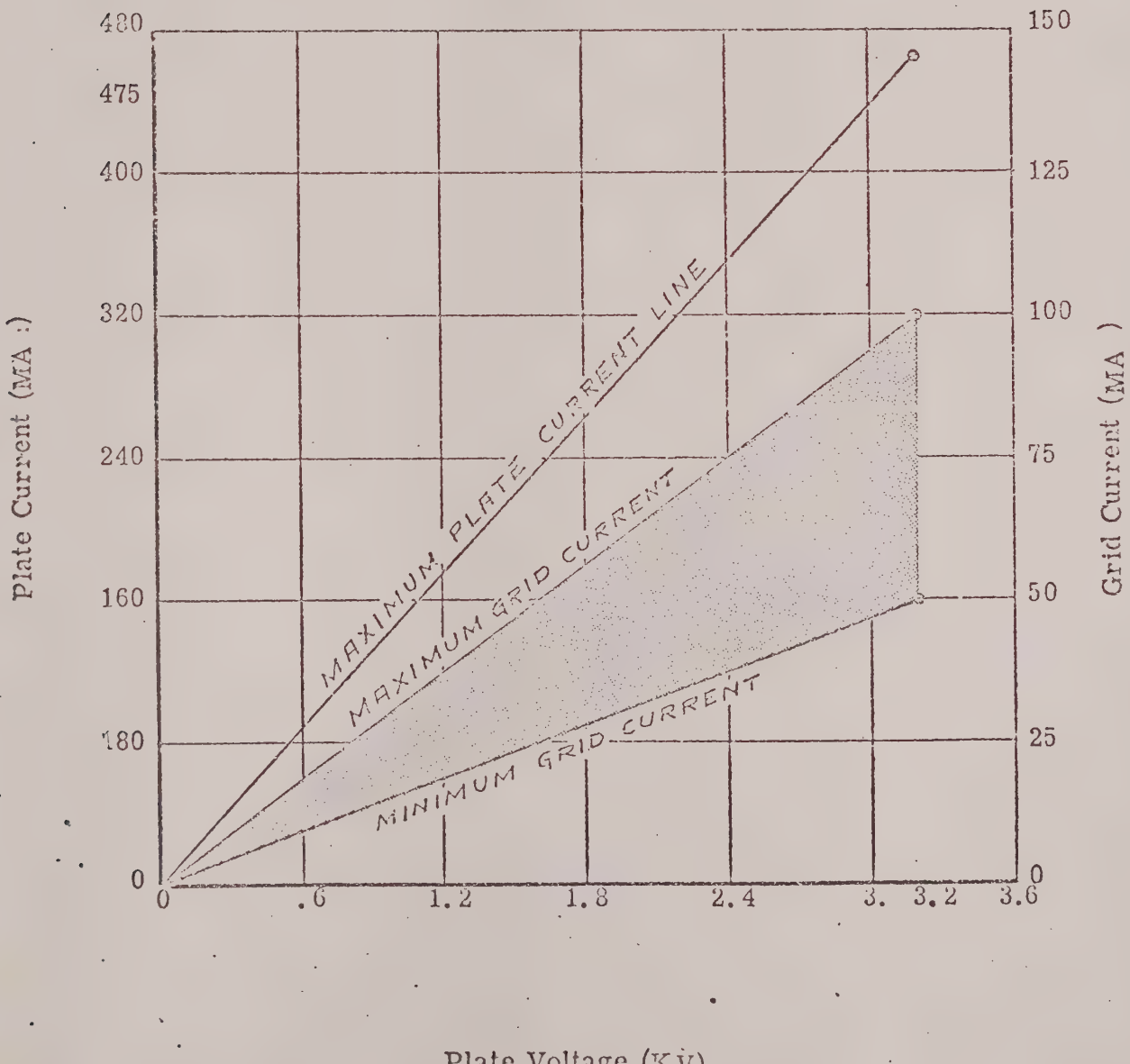
For uninterrupted production, it is suggested that the following replacement parts be stocked:

Quantity	Description	Reference Designation	Lepel Stk. No.
1	Oscillator Tube	V3	018-0033
1	Grid Bypass Capacitor or Plate Blocking Capacitor	C9 or C5	007-0104
1	Grid Resistor	R4	038-0014
1	Plate Bypass Capacitor	C4	007-0035
2	Thyratron Tube	V1, V2	018-0024

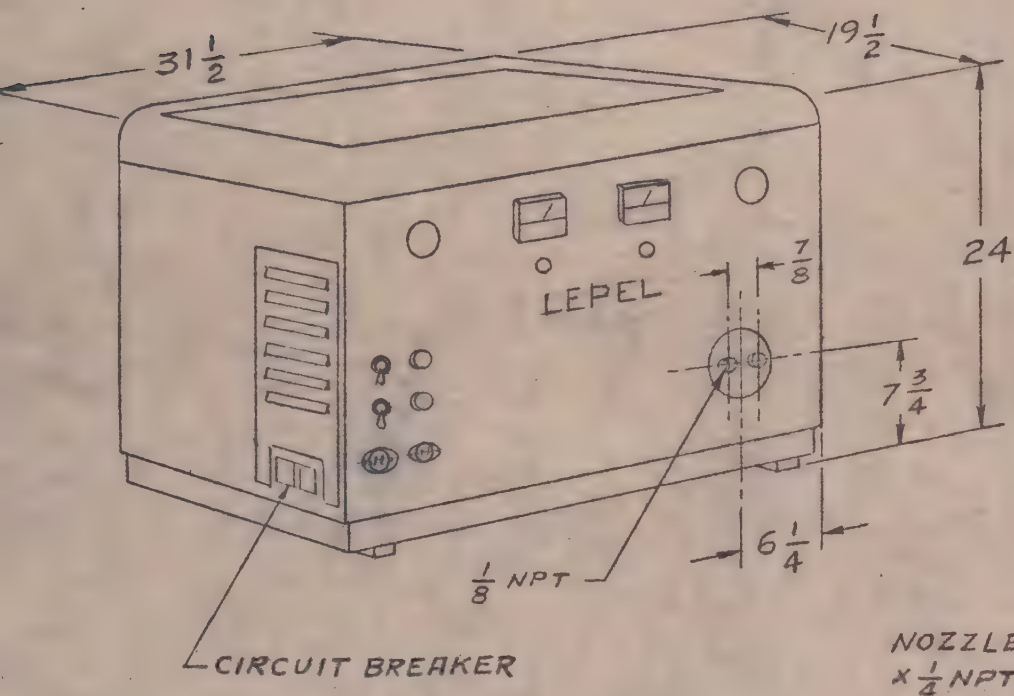
TROUBLE SHOOTING GUIDE FOR SCHEMATIC DIAGRAM T-101-29

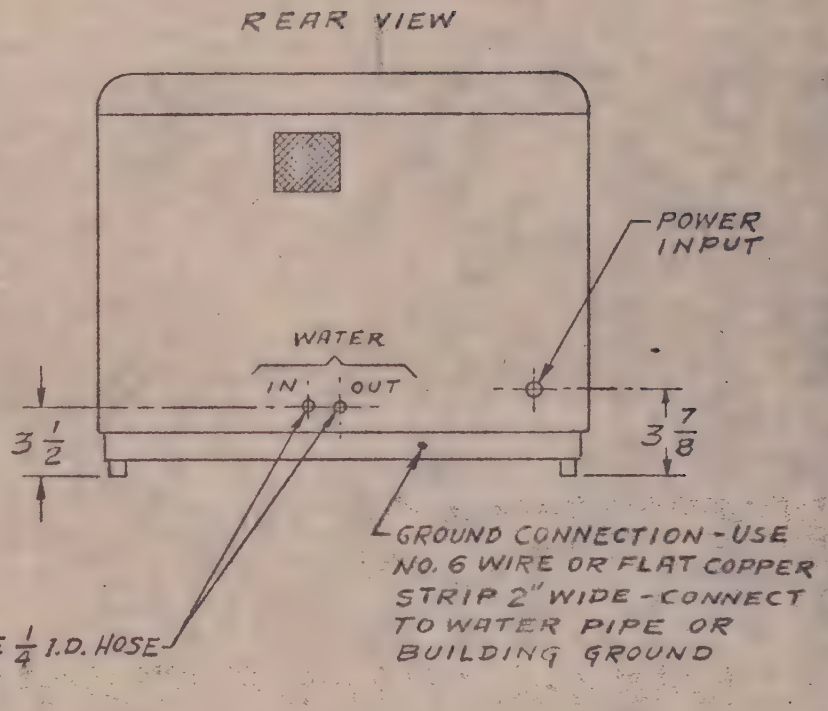
TROUBLE	PROBABLE CAUSE	CHECK
No filament voltage	a. Defective main fuse	
	b. Open circuit breaker	CB1
	c. Defective oscillator filament transformer	T3
	d. Open fuse	F1, F2
Plate contactor fails to close	a. Defective plate contactor	K2
	b. Defective time delay relay	K3
	c. Open safety interlock switch	S5 thru S8
	d. Insufficient water pressure	
	e. Defective water pressure	S3
Plate overload relay trips as soon as plate power is applied	a. Load coil over-coupled (reduce tank tap setting)	L3
	b. Shorted plate blocking capacitor	C5
	c. Shorted grid bypass capacitor	C8
	d. Shorted plate bypass capacitor	C4
	e. Defective oscillator tube	V1
	f. Defective rectifier	CR1, CR2
	g. Shorted tank capacitor	C6
	h. Insufficient grid current (increase 'Grid Control' setting)	L2
No. R.F. Power output; contactor operating (no reading on plate current meter)	a. Defective oscillator tube	V1
	b. Open circuit in DC power supply	
	c. Defective plate transformer	T2
	d. Open tank circuit	
Plate current present but no grid current (no reading on grid current meter)	a. Insufficient grid drive (increase grid control setting)	L2
	b. High resistance contact or loose connection in tank circuit	
	c. Open plate blocking capacitor	C5
	d. Defective oscillator tube	V1
	e. Open grid circuit	
	f. Defective grid resistor	R9

9. GRAPH Recommended Grid and Plate Current Ranges
Versus
Plate Voltage
For Tube Type 9902/5868
(Generator T-1)



LEPEL HIGH FREQUENCY LABORATORIES, Inc.




REAR VIEW
POWER INPUT
WATER
IN
OUT
3 1/2
3 7/8
GROUND CONNECTION - USE NO. 6 WIRE OR FLAT COPPER STRIP 2" WIDE - CONNECT TO WATER PIPE OR BUILDING GROUND
NOZZLE 1/4 I.D. HOSE x 1/4 NPT

INSTALLATION DIAGRAM
GENERATOR
T-1-1-KCI, MC-BIA
(WITH SCR POWER CONTROLLER)

DWG No. 9570254

DRAWN BY: P. Bazylewicz 10-23-74

ENGINEER: [signature] (10-23)-74

LEPEL CORPORATION

GENERATOR INSTALLATION SPECIFICATIONS

NOTE: 1 — NOTE: 2

GENERATOR MODEL	POWER INPUT KVA	POWER INPUT PHASE	INPUT LINE VOLTS	FULL LOAD CURRENT AMPS	ELECTRICAL SERVICE FUSE AMPS	ELECTRICAL SERVICE CABLE AWG MCM	WATER REQ.** GPM	WATER FITTING NPT*** INLET	WATER FITTING NPT*** OUTLET
T-1-1	2.4	1	115	21	40	8	1	*1/4	* 1/4
T-2.5	5.5	1	230	24	40	8	3	*1/2	*1/2 *1/4
			460	12	25	10			
T-5-3	12.7	3	230	32	45	8	4	*1/2	*1/2 *1/4
			460	16	30	10			
			550	13.5	25				
T-7.5-3	16.7	3	230	42	60	6	4	1/2	*1/2 3/8 3/8
			460	21	30	10			
			550	17.5					
T-10-3	25.4	3	230	64	110	2	8	1	1-1/4
			460	32	60	6			
			550	27					
T-15-3	32.8	3	230	82	125	1	10	1	1-1/4
			460	41	80	4			
			550	34					
T-20-3	46	3	230	116	175	00	10	1	1-1/4
			460	58	80	4			
			550	47					
T-25-3	58	3	230	144	250	250	14	1	1-1/4
			460	72	125	1			
			550	60					
T-30-3	68	3	230	170	250	250	14	1	1-1/4
			460	85	125	1			
			550	71					
T-35-3	80	3	230	200	300	350	22	1	1-1/4
			460	100	175	00			
			550	84	125	1			
T-40-3	89	3	230	224	350	500	22	1	1-1/4
			460	112	175	00			
			550	94					
T-50-3	120	3	230	300	450	700	22	1	1-1/4
			460	150	250	250			
			550	120	175	00			
T-60-3	143	3	230	360	500	——	22	1	1-1/4
			460	180	250	——			
			550	150					
T-80-3	192	3	230	480	800	——	30	1 ****	1-1/4 ****
			460	240	400	——			
			550	200	350	——			
T-100-3	240	3	230	600	1000	——	35	1 ****	1-1/4 ****
			460	300	450	——			
			550	250	400	——			
T-125	298	3	460	375	550	750	40	1-1/2	1-1/2 *
T-160	348	3	460	500	700	750	65	1-1/2	2" *
T-200	475	3	460	600	800	——	65	1-1/2	2" *
T-250	541	3	460	680	800	——	85	2"	4" *

COOLING WATER NOTES

* Denotes water hose nozzle.

** The inlet pressure must fall between 40 PSI, the minimum pressure required to maintain the specified flow rate shown, and 65 PSI, the maximum allowable pressure.

If the inlet pressure falls below 40 PSI, install a booster pump in the water supply line.

If the inlet pressure exceeds 65 PSI install a pressure regulator in the water supply line.

Water inlet temperature must not exceed 80°F (70°F if the generator is equipped with the sealed cabinet air cooling).

When a generator is supplied with a water recirculator utilizing a water to water heat exchanger, the consumption of city water is automatically adjusted to the varying cooling requirements of the generator.

When a generator is so-equipped, the water supply requirements increase by 3 GPM for generators from T-10-3 to T-40-3 and by 5 GPM for generators from T-50-3 to T-100-3.

*** To insure an adequate flow, the sizes of the water supply and drain lines should equal or exceed those of the 'inlet' and 'outlet' fitting sizes.

Gravity outlet drains are recommended.

If the use of an overhead drain is unavoidable, install a check valve in this line NEVER a manually operated valve.

**** 1 1/2" when a water recirculator is used.

ELECTRICAL NOTES

1. For information on generator models not listed please contact Lepel Corporation.
2. 'Full Load Current Amps' are based on the 'Input Line Volts' which are nominal values. Lepel generators, however, are designed to operate over the following voltage ranges and the 'Electrical Service' listing is based on the maximum line current requirements for the lowest acceptable line voltage as listed below:

Nominal	Range
115 Volts	105 Volts to 125 Volts
230 Volts	200 Volts to 250 Volts
460 Volts	400 Volts to 500 Volts
550 Volts	500 Volts to 600 Volts

In general, Lepel line circuit breakers are rated at 125% of this maximum line current.
The cable sizes listed conform to the National Electrical Code for copper conductors rated at 75° C. It is, however, recommended that the user consult the local electrical code requirements for conductor ampacities.

* *Includes Recirculator Input Power.

DWG. NO. 9570041
REV. 10-17-80

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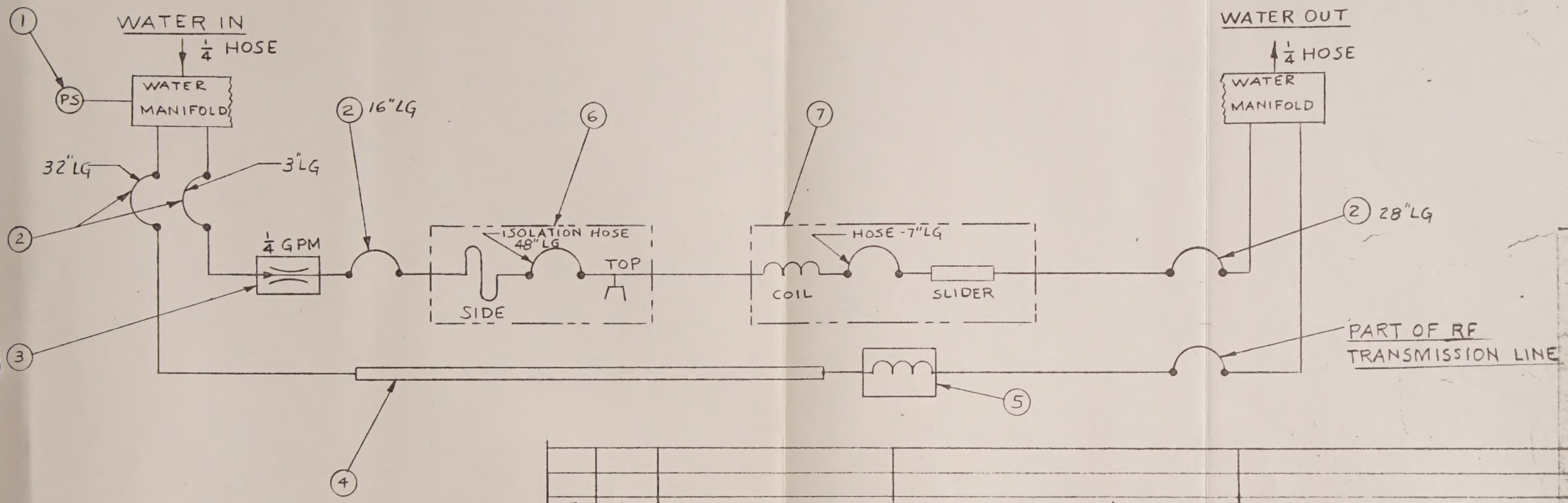
REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVAL
A		ADDED NOTE 1	10-16-72	LLC



NOTE
1- ITEM (4) CAN BE EITHER OF THE FOLLOWING

A) - COAXIAL CABLE - DWG NO. 3020024
OR
B) - FLEXIBLE LEADS - DWG NO. 12330061

ITEM	QUAN	PART NO	DESCRIPTION	SPECIFICATION
7	1		COIL ASSY - TANK & GRID	
6	1	007-0078	CAPACITOR, TANK	
5	1		LOAD COIL	
4	1	SEE NOTE 1	RF TRANSMISSION LINE	LENGTH TO SUIT
3	1	2204-0007	VALVE, FLOW CONTROL	1/4 GPM - 3/8 NPT
2		575-0001	HOSE, STEAM	RUBBER - 1/4"
1	1	044-0001	SWITCH, PRESSURE	

NEXT ASSY	USED ON APPLICATION
	T-1-1-KC1-B1A
	T-1-1-KC1-BA
	LEPAK 100 M
	LEPAK 100

UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES
TOLERANCE ON: FRACTIONS DECIMALS ANGLES

DRAWN BY P. Gedaly DATE 3.16.72
CHECKED DATE
APPROVED FOR MFG DATE
ENGINEER DATE

NAME: FLOW DIAGRAM 1KW GENERATOR

LEPEL
HIGH FREQUENCY LABORATORIES, INC.
59-21 QUEENS-MIDTOWN EXPRESSWAY
MASPETH, NEW YORK CITY

MATERIAL
FINISH
DWG SIZE: B
DRAWING NO. 6580018
REV: A
SCALE
SHEET 1 OF 1

BRUNING 40-21

MP MASTER
MA29121